

U. S. Patent Application Serial No. 10/664,106
Reply to OA of March 7, 2007

REMARKS

The Applicant and his Representative wish to thank the Examiner for scheduling the personal interview of May 3, 2007 and for the courtesies extended to them during the interview.

Claim 1 is amended as discussed with the Examiner and as described in the interview summary, in order to more clearly define the claimed invention. Support for the amendment is found in the specification at page 13, lines 22 - 26.

It is believed that this response is fully responsive to the Office Action mailed March 7, 2007.

The withdrawal of the claim objections and rejections of Claims 1 - 21 under 35 USC §112, second paragraph, found in the previous Office Action, is acknowledged and the Applicants wish to thank the Examiner.

The present invention is a rechargeable battery, having at least one anode, at least one cathode, each cathode being in opposing spaced relationship to each anode. Two layers of differing porous separators/binders are intermediate each opposing anode and cathode to maintain the opposing spaced relationship. A non-aqueous electrolyte fills pores of the layers of separator/binder.

A first separator/binder comprises a mixture of polymer P₁ and a particulate material M₁ and a second separator/binder comprises a mixture of polymer P₂ and a particulate material M₂. Polymer P₁ is soluble to a degree for forming a polymeric solution in a solvent S₁ and polymer P₂ is soluble to a degree for forming a polymeric solution in a solvent S₂. Also polymer P₁ remains solid in the presence of solvent S₂, polymer P₂ remains solid in the presence of solvent S₁, particulate material M₁ remains solid in the presence of solvent S₁, and particulate material M₂ remains solid in the

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presence of in solvent S₂. The opposing spaced relationship of each cathode to each anode is maintained by each anode being bound to the first separator/binder, the first separator/binder being bound to the second separator/binder, and the second separator/binder being bound to each cathode. The present invention utilizes polymer and solvent solubility relationships to form an electrode stack requiring no external means to keep the rigidity of the stack.

As to the Merits:

/ Claims 1 - 3, 5 - 8, 10, 12 - 15, 18 and 20 are rejected under 35 USC §102(b) as being anticipated by WO 97/08763 to Yamashita et al. (U.S. Patent No. 6,287,720). Reconsideration and removal of this rejection is respectfully requested.

Claims 9, 16, 17, 19 and 21 are rejected under 35 USC §103(a) as being unpatentable over WO 97/08763. Reconsideration and removal of this rejection is respectfully requested.

Claim 4 is rejected under 35 USC §103(a) as being unpatentable over WO 97/08763 in view of Kawakami et al. (U.S. Patent No. 5,582,931). Reconsideration and removal of this rejection is respectfully requested.

Claim 11 is rejected under 35 USC. §103(a) as being unpatentable over WO 97/08763 in view of Ohsawa et al. (U.S. Patent No. 5,225,296). Reconsideration and removal of this rejection is respectfully requested.

Regarding independent Claim 1, from which all the remaining claims depend, it is alleged in the Office Action that Yamashita et al. teaches a rechargeable battery comprising an anode and a cathode in opposing spaced relationship to each other and having two intermediate layers of differing porous separators/binders (13A) and (13B) which are described throughout the reference and in

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particular in col. 12 line 62 et seq. and col. 13 line 45 et seq. and line 58 et seq.

It is respectfully submitted that the present claimed invention is distinct from the battery of Yamashita et al. In the present claimed battery, because of the materials of the battery and the fabricating method used, an opposing spaced relationship of the cathodes and anodes is maintained by binding provided by the first separator/binder and the second separator/binder (see detailed description on pages 7 - 9) of the specification. Such maintaining of a spaced relationship by the binding provided by the first and second separator/binders having two different polymers with the claimed solubility properties is not found in the battery of Yamashita et al.

Fig. 5 of Yamashita et al. depicts a battery of Yamashita et al. having the alleged separator/binder (13A) and (13B) between an anode and a cathode, however, the first alleged separator/binder having polymer P_1 is not shown as being bound to the alleged second separator/binder having polymer P_2 , as such arrangement is not taught. Thus the anode is not bound to the cathode, through the separator/binders, as in the present claimed invention.

The second polymer of Yamashita does not have any binding function between an anode and a cathode even though the polymer layers may have been fabricated using different polymers and solvents. Yamashita's invention does not teach how to form a bound electrode stack using the concept of "separator layer" with "binder layer" and the polymer-solvent-particle relationships required for making the present claimed invention. As taught throughout Yamashita et al., the polymers are dried on the anode and cathode prior to stacking the anode and cathode.

It is respectfully submitted that the rechargeable battery defined in present Claim 1 is patentably distinct and non-obvious in view of Yamashita. At lines 20 and 21 of Claim 1 it is

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recited: "said opposing spaced relationship of each cathode to each anode is maintained by each anode being bound to the first separator/binder, the first separator/binder being bound to the second separator/binder, and the second separator/binder being bound to each cathode. It is respectfully submitted that the above-recited phrase found in Claim 1 clearly distinguishes the claimed invention over the teachings of Yamashita, as it can not properly be said that alleged separators/binders (13A) and (13B) provide binding of an anode to a cathode in the manner claimed.

In view of the above remarks, it is respectfully requested that the above rejections be removed.

It is believed that Claims 1 - 21, as amended to include the language discussed with the Examiner at the personal interview, are now in condition for allowance. Allowance of Claims 1 - 21 is respectfully requested.

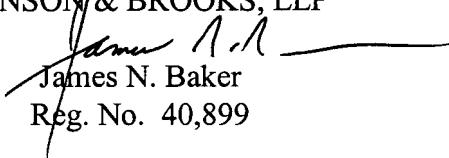
If there are any issues of a minor nature remaining, the Examiner is urged to contact Applicants' agent, the undersigned, at Area Code (412) 281-2931.

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Respectfully submitted,

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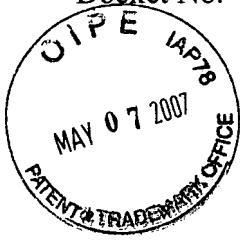
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Commissioner for Patents
P.O. Box 1450
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Barbara A. Konopski
(Signature)

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May 7, 2007